

DRAFT Data Availability Document

California Minimum Essential Datasets (MEDS)

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Introduction

The State of California, through the Office of the State Chief Information Officer (OCIO) and the California Emergency Management Agency (CalEMA) is developing framework data services for an initial set of geographic data known as Minimum Essential Data Sets (MEDS). The MEDS data sets are comprised of three data types 1) Imagery, 2) Transportation and 3) Landmarks.

The State of California intends to use the MEDS project to publish data from best available public sources. Commonly used, easily available landmarks, transportation, and imagery data will provide the context to make other layers of geocoded data meaningful and usable to consumers of varying degrees of technical expertise.

This report provides information on the overall availability of public data to support a statewide Minimum Essential Datasets (MEDS). The report defines readily available MEDS data sources and the sources that were agreed to by MEDS Steering Committee as the foundation for each of the three categories (imagery, transportation and landmarks). The focus on specific data sources in this document is based on the Data Requirements section in the MEDS Functional Requirements.

The report will briefly discuss the extent to which selected MEDS data sources meet user requirements. The report will also describe data scale, source, extent, currentness, and references to facilitate the acquisition and compilation of the data for the full implementation of MEDS in a subsequent project.

Data Requirements

It was apparent from the pre-workshop Survey Results and the Requirement Interview Workshops that the GIS data needs are diverse across the State of California. The availability of data to support a statewide Minimum Essential Datasets (MEDS) is different for each MEDS category. The nature and level of existing data for each of the categories varies significantly based on user/community needs. In deciding which data will form MEDS, the project management team and the Steering Committee agreed that the appropriate starting data base for each of the three categories (imagery, transportation, and landmarks) is the best readily available statewide coverage source. These seamless statewide sources can then be supplemented by better publicly available data at the local scale, where available.

MEDS will serve several essential functions strictly in the storage and serving of data. First, it will allow users at all levels of government to easily access a common dataset. Secondly, it will allow local or regional jurisdictions to readily access data for adjacent jurisdictions. Thirdly, it will serve as a backup repository for local governments – a failsafe in case their own local data center is rendered inoperable during an event.

[1] Imagery

Images of the Earth taken from above have been acquired since the middle of 1860's from the air and since 1960 from space for aerial reconnaissance of the planet's landforms, vegetation, and resources. Today, aerial and satellite images, known as remotely sensed images, are acquired from different altitudes, at different resolution, using different types of sensors, and are custom processed into various derivative product types for various use and purposes.

Local, regional and state governments have invested considerable resources in developing Geographic Information Systems (GIS) to aid them in their planning and decision making processes. A digital image basemap is a key information layer in many government GIS systems. MEDS imagery will be used as a basemap for visual interpretation of land features. Initial imagery acquired for MEDS must meet the following minimum criteria:

- Dates of Coverage: acquired after the year 2000
- Availability: License free public data deliverable in digital format
- Rendition: Natural color
- Resolution: 1 meter or better
- Processing: Ortho-rectified and GIS ready

Numerous Federal and State programs include an imagery acquisition component: the National Agriculture Imagery Program (NAIP) of the U.S. Department of Agriculture (USDA); the USGS National Orthoimagery Program; numerous State aerial photography and orthoimagery programs, as well programs such as Homeland Security (133 Urban Areas), the Federal Emergency Management Agency (FEMA) Flood Map Modernization Program, and the Census Bureau MAF/TIGER Modernization Program

Imagery Sources for MEDS

Digital orthoimagery is collected by a variety of Federal and State agencies and organizations, each with specific areas of interests and requirements. High Resolution Orthoimagery (HRO), 1 meter or better, can be freely downloaded from multiple online map services and ftp websites maintained by federal, state, and local government agencies. HRO availability varies greatly by location, date of acquisition, and coverage extent. Primary concerns surrounding imagery are the size of the datasets, and the bandwidth available to retrieve it.

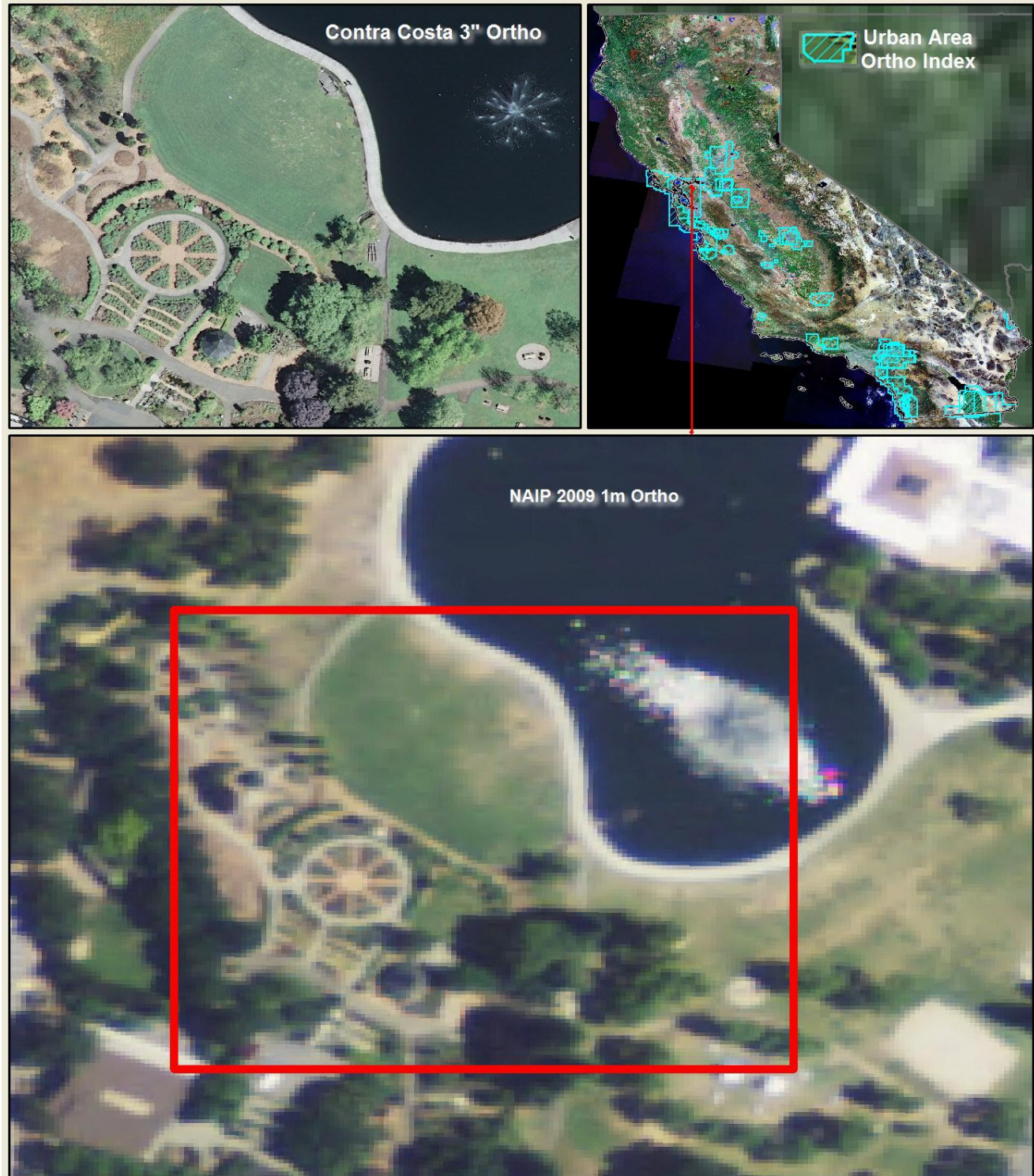
The Steering Committee's decision was that the starting point for statewide best available imagery will be the natural color, 1-meter resolution orthophotos from the 2009 National Agriculture Imagery Program (NAIP). NAIP will be the base, seamless, statewide imagery layer and will be supplemented by high resolution urban footprint (1 foot or better), where available (see figure 1). The USGS has agreed to provide the required imagery to the MEDS project. Due to the sheer storage size of available imagery coverage for the state, the datasets will be delivered using high capacity storage drives.

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While there is some desire within the stakeholder community to build an online catalog of all available historical imagery, the initial implementation of MEDS will be restricted to the most recent NAIP plus the most recent high resolution urban footprint.

Figure 1: California High Resolution Urban Area Orthoimagery compared to NAIP 2009



National Agriculture Imagery Program (NAIP) 2009

The National Agriculture Imagery Program (NAIP) acquires aerial imagery during the agricultural growing seasons in the continental U.S. Pilot projects began in 2001-2002. The program has continued and grown since. After an initial five year cycle and a transition year (2008), 2009 marks the start of a second acquisition cycle. Imagery is acquired by independent contractors from aircraft that have sensor systems meeting rigid calibration specifications. Commercial satellite imagery may also be used in NAIP contracts, but it hasn't been to date.

(National Agriculture Imagery Program (NAIP) Information Sheet, May 2009)

Technical specifications

NAIP imagery is either natural color or "four band" imagery (with red, green, blue, and near infrared bands), and is delivered in the year of acquisition. NAIP imagery is acquired at a one-meter ground sample distance (GSD) with a horizontal accuracy that matches within six meters of photo-identifiable ground control points, which are used during image inspection.

The USDA Aerial Photography Field Office (APFO) has stringent imagery compliance guidelines, and all deliverables are inspected to ensure accuracy and compliance with the contract. Because NAIP is an annual program with short flying seasons, some defects, such a maximum 10% cloud cover are accepted.

Availability

Imagery comes in two main formats:

1- Compressed County Mosaic (CCM):

Mosaics are generated by compressing digital ortho quarter quads (DOQQs) into a single mosaic. NAIP 2009 Natural Color compression is either MrSID MG3 (RGB states) or JPEG2000 (4 band states). For California, MrSID compressed versions of the 2009 NAIP imagery by county are available for download from the Cal-Atlas geospatial Clearinghouse at: <http://atlas.ca.gov/download.html>

2- Digital Ortho Quarter Quad (DOQQ):

The DOQQs are generated in GeoTIFF format. Each individual image tile (DOQQ) within the mosaic covers a 3.75 x 3.75 minute quarter quadrangle plus a 300 meter buffer on all four sides. For California, the 2009 DOQQ tiled imagery will be available in Spring 2010; 2005 DOQQs are currently available (See Table 1)

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Table 1: Available Statewid2 NAIP Orthoimagery

State-wide Coverages				
Area	Specifications	Year Flown	Status	File Size
CA NAIP	tiffs--4 band - 1-m, NC	2009	Feb. 2010	
CA NAIP	compressed MrSID mosaics - 1-m, NC	2009	Available	142 gb
CA 2005 CIR	tiffs - 1-m, CIR	2005	Available	1.8 tb
CA NAIP	tiffs - 1-m, NC	2005	Available	1.8 tb
CA NAIP	compressed MrSID mosaics - 1-m, NC	2005	Available	

CIR = Color Infra-Red

NC = Natural Color

gb = Gigabyte

tr = Terrabyte

Available High Resolution Urban Orthoimagery

The need for up-to-date imagery is critical for Homeland Security, and Emergency Response. The Orthoimagery category is one of the framework layers for The National Map. Orthoimagery data typically are high resolution aerial images that combine the visual attributes of an aerial photograph with the spatial accuracy and reliability of a planimetric map. The process of orthorectification removes most of the feature displacements and scale variations caused by terrain relief and sensor geometry. The imagery can be used as a base layer for updating or deriving additional geographic information, such as transportation networks, hydrographic features, elevation, and land cover.

Accessibility

Access and distribution of National Map orthoimagery data is unrestricted and can be viewed and downloaded from the National Map Web site (<http://nationalmap.usgs.gov>) through USGS web services such as the National Map Viewer (See figure 2). In addition, the data can be also is available as a WMS service using any application that supports OGC Web Mapping Service. For urban orthoimagery the server URL is:

http://gisdata.usgs.gov/wmsconnector/com.esri.wms.Esrimap/USGS_EDC_Ortho_Urban?SERVICE=WMS&REQUEST=GetCapabilities

Additional USGS supported WMS services and descriptions and instructions on how to use them can be found on the USGS Emergency Operations webpage at <http://hdds.usgs.gov/EO/gis.php>.

Some of the orthoimagery purchased off the shelf by National Geospatial-Intelligence Agency (NGA) can only be viewed but not downloaded. Most have term license restrictions, after a certain date they become public domain.

Availability

1-ft leaf-off orthoimagery over 133 urban areas are acquired by the USGS in partnership with the NGA and State and local governments under the Homeland Security Infrastructure in California Program (HSIP). High-resolution urban orthophotos are being produced by utilizing USGS in-house production expertise at the Western Geographic Science Center in Menlo Park. Orthoimagery data are archived in distributed databases with FGDC-compliant metadata.

California Minimum Essential Data Sets Map Services

Document Type: data Availability Document

High resolution (3 inches to 1 foot) color orthoimagery is acquired for some of California's most populated metropolitan areas as part of the USGS 133 Cities Project for of the United States. Those include major urban areas in the Central Valley, San Francisco, Los Angeles, San Diego, San Bernardino/Riverside, and Mission Viejo, as well as a large area in the Sacramento Delta. See Table 2 for urban orthoimagery availability in California.

Figure 2: USGS National Map Viewer - Urban Area Ortho Index

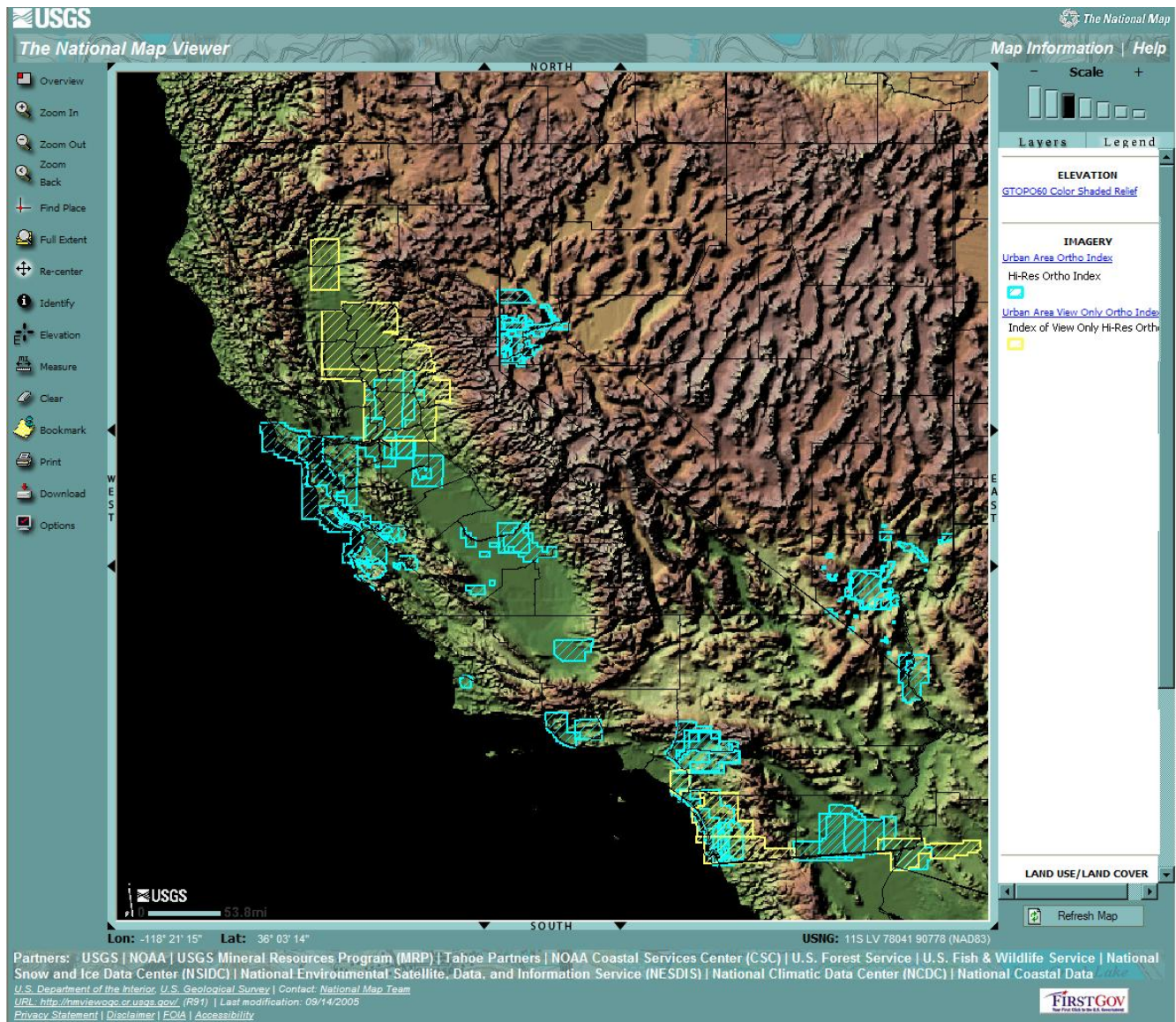


Table 2: Available Public Domain, High Resolution, Natural Color Orthoimagery

Area	Specifications	Year Flown	Status	File Size
County-wide Coverages				
San Mateo Co.	Imagery-hi-res - 6"	2005	Available	166 gb
Alameda Co.	Imagery-hi-res - 6" and 1' NC	2006	Available	383 gb
Alameda Co.	Imagery-hi-res - 6" and 1' CIR	2006	Available	271 gb
Santa Clara Co.	Imagery-hi-res - 6" NC	2006	Available	
Contra Costa Co.	Imagery-hi-res - 3", 4", 6" NC	2008	Available	687 gb
Contra Costa Co.	Imagery-hi-res - 3", 4", 6" CIR	2008	Available	687 gb
Contra Costa Co.	MrSIDs - NC	2008	Available	67.5 gb
Solano Co.	Imagery-hi-res - 4" and 8"	2008	In QA	
Napa Co.	Imagery-hi-res - 6" urban; 1' rural NC	2006	Available	114 gb
Napa Co.	Imagery-hi-res - 6" urban; 1' rural CIR	2006	Available	114 gb
Los Angeles Co.	Imagery-hi-res - 1' NC	2006	Available	377 gb
Los Angeles Co.	Imagery-hi-res - 1' NC	2008	Available	348 gb
Monterey Co.	Imagery-hi-res - 1'	2007	Available	409 gb
San Benito Co.	Imagery-hi-res - 1'	2007	Available	
Santa Cruz Co.	Imagery-hi-res - 1'	2007	Available	38.4 gb
Ventura Co.	Imagery-hi-res - 1'	2007	Available	194 gb
Kern Co.	Imagery-hi-res - 1' NC	2008	Available	757 gb
Imperial	Imagery-hi-res - 1' urban; 2' rural	2005	Available	164 gb
Imperial	Imagery-hi-res - 6" urban; 1' rural	2008	Available	947 gb
Urban Areas/Cities				
San Diego	Imagery-hi-res - 3" NC	2005	Available	529 gb
Chula Vista	Imagery-hi-res - 3" NC	2005	Available	21.8 gb
Poway	Imagery-hi-res - 3" NC	2005	Available	60.1 gb
San Diego UA	Imagery-hi-res - 1' NC	2006	Available	265 gb
San Francisco UA	Imagery-hi-res - 1'	2004	Available	150 gb
San Francisco UA	Imagery-hi-res - 1'	2008	Available	250 gb
Modesto UA	Imagery-hi-res - 3" Black/white	2006	Available	50.2 gb
Modesto UA	Imagery-hi-res - 1'	2002	Available	48.4 gb
Fresno UA	Imagery-hi-res - 1" NC	2007	Available	73.6 gb
Stockton UA	Imagery-hi-res - 6" NC	2006	Available	86.1 gb
Sacramento UA	Imagery-hi-res - 6" NC	2006	Available	384 gb
Sacramento UA	Imagery - 6" NC	2009	Due 12/2009	
Riverside/San Bernadino UA	Imagery-hi-res - 1' NC	2008	Available	92 gb
Riverside/San Bernadino UA	Imagery-hi-res - 1' NC	2004	Available	49.8 gb
San Bernardino	Imagery-hi-res - 1' NC	2007	Available	79.5 gb
San Bernardino	Imagery-hi-res - 1' NC	2006	Available	
Los Angeles UA	Imagery-hi-res - 1' NC	2003	Available	150 gb
Mission Viejo UA	Imagery-hi-res - 1'	2003	Available	23.3 gb
Mission Viejo UA	Imagery-hi-res - 1' NC	2007	Available	24.5 gb
Oxnard UA	Imagery-hi-res - 1'	2005	Available	
Oxnard	Imagery-hi-res - 6" urban; 1' rural NC	2007	Available	244 gb
Bakersfield	Imagery-hi-res NC - 6"	2008	Available	197 gb
Santa Cruz	RGB - 3"	2007	Available	147 gb
San Benito	RGB tiffs - 3"	2007	Available	4.44 gb
Monterey	RGB tiffs - 3"	2007	Available	84.8 gb
Miscellaneous Collections				
Border	30 miles north; 10 miles Mexico - 1' NC	2008	Available	1.118 tb
Central Coast areas	MrSIDs; - 1' and 2'	2003	Available	32.4 gb
Post fire San Diego	NC - 1'	2007	Available	297 gb
Central Valley ortho	tiffs - 6"	2008	Pending	

UA = Urban Area
hi-res = High Resolution

CIR = Color Infra-Red
RGB = Red Green Blue color bands

NC = Natural Color

tr = Terrabyte
gb = Gigabyte

[2] Transportation

Transportation is a large data domain, potentially including all forms of transport across land, water and sky. There was significant discussion during the workshops of the many potential characteristics of transportation data, including both permanent travel restrictions such as bridge clearances or weight limits and more transitory barriers such as weather or natural or man-made incident street closures. One significant point of discovery was that local dispatch centers rely on their own in-house data for routing of emergency vehicles and were unanimous in their opinions that their local data was best suited to their local needs. The project team concluded that MEDS transportation would not replace local data for these specialized routing needs.

Transportation Public Sources

Local Government Data

Many local governments and agencies develop and maintain their own transportation layers; those include city and county governments, Regional Transportations Planning Agencies (RTPAs), Metropolitan Planning Organizations (MPOs), and the California Department of Transportation (Caltrans) (See map in Appendix 1). Depending on the agency and its business needs the database structure, quality and content of public transportation data layers are maintained at various levels. Some of this data can be freely downloaded online from the respective agencies websites (see table Appendix 2), while other agencies will share their data for a fee. Several agencies built their high quality transportation database on top of license-restricted commercial datasets for internal use only and cannot share their data. There is currently no standardized seamless transportation network database built and maintained by local, regional or state agencies within California that could serve most of the business needs for all the stakeholders in California.

TIGER/Line

The US Census Topologically Integrated Geographic Encoding and Referencing (TIGER)/Line files are the only publicly-available source of a seamless, comprehensive road network for all of California. TIGER/Line files are a digital database of geographic features, such as roads as well as railroads, rivers, lakes, legal boundaries, census statistical boundaries, etc. covering the entire United States. The data base contains information about these features such as their location in latitude and longitude, the name, the type of feature, address ranges for most streets, the geographic relationship to other features, and other related information. They are the public product created from the Census Bureau's TIGER database.

(<http://www.census.gov/geo/www/tiger/overview.html>)

Transportation Data Sources for MEDS

The Steering Committee determined that 2009 vintage TIGER/Line files will be the initial statewide foundation for MEDS transportation data. TIGER centerlines may be supplemented with local street centerline data from local sources, where available. Routing functionality will not be an initial feature of the MEDS transportation dataset. The ultimate goal is to serve a seamless statewide street centerline network once such a publicly-available and sustainable transportation layer is developed for California.

TIGER/Line as MEDS Transportation Layer

The TIGER/Line data set holds the street features (roads) in the All Lines Shapefile (Edges) along with other linear feature such as railroads and hydrography. The All Lines Shapefile is available at the county level only; to obtain the coverage for the entire state, the files need to be downloaded individually for all 58 Counties. Several attribute flags within the shapefile indicate if the feature is a road, rail, or water. Additional attribute data associated with the All Lines features are available in relationship files that must be also downloaded.

A new edition of the TIGER/Line shapefiles is released approximately once per year. The latest version was released in October 2009 and can be downloaded from the U.S. Census Bureau at <http://www2.census.gov/cgi-bin/shapefiles2009/national-files> or via FTP at <ftp://ftp2.census.gov/geo/tiger/TIGER2009/>

The following are highlights of the TIGER/Line Shapefiles relevant to using the street features and data as a transportation layer for MEDS. The full information can be found in the [2009 TIGER/Line Shapefiles Technical Documentation](#)

Spatial Accuracy and Precision

The spatial accuracy of the street network meets the Census Bureau's horizontal spatial accuracy standard of Circular Error 95 (CE95) at 7.6 meters (about twenty-five feet) or better. This accuracy standard requires that 95 percent of the time, the distance between the sample control points coordinates and their corresponding street centerline file intersection points not exceed 7.6 meters, i.e., a file point will fall within a radius of 7.6 meters of its corresponding control point.

Coordinates in the TIGER/Line Shapefiles have six decimal places, but the positional accuracy of these coordinates is not as great as the six decimal place precision suggests. The spatial accuracy varies with the source materials used. Thus, the level of spatial accuracy in the TIGER/Line Shapefiles is not suitable for high-precision measurement applications such as engineering problems, property transfers, or other uses that might require highly accurate measurements of the earth's surface.

Metadata

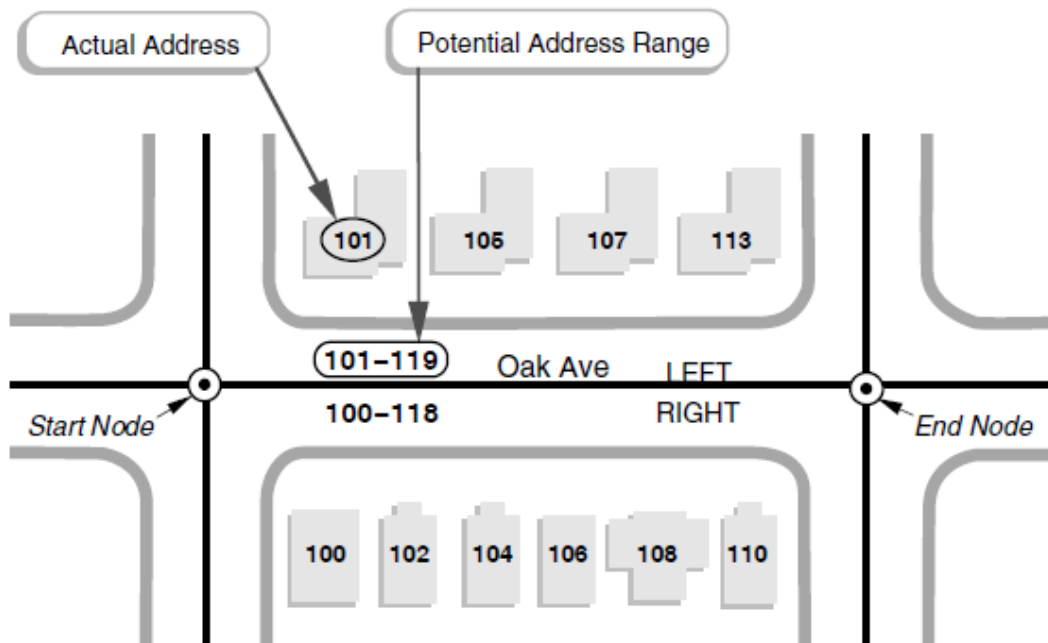
The TIGER/Line Shapefiles metadata contains an entity and attribute information section. The metadata is packaged with the shapefiles and relationship files. The metadata files associated with the shapefiles have the extension .shp.xml, and those associated with the relationship files have the extension .dbf.xml. The metadata is FGDC compliant. In addition, the All Lines Shapefile also contains a Spatial Metadata Identifier (SMID), which identifies the source of the coordinates for each edge and provides the link between the TIGER/Line Shapefiles and the source and horizontal spatial accuracy information.

Geocoding Addresses

The 2009 TIGER/Line Shapefiles contain left- and right-side most-inclusive address ranges, not individual addresses¹ (See Figure 3). The attributes of each address range are stored in the *Address Ranges Relationship File*. All address ranges will have a ZIP Code where the ZIP Code is known. To get the best match results, the Census Bureau advises data users to use all of the available address ranges to geo-reference/geocode addresses, including those in the *Address Ranges Relationship File*.

Figure 3: TIGER/Line® Shapefiles Address Range Basics

The TIGER/Line Shapefiles contain potential address ranges for city-style addresses. The edge (between the start node and the end node) in the diagram below has two address ranges; the left side has odd-numbered addresses and the right side has the complementary even-numbered addresses. Potential address ranges along an edge have values that encompass the addresses of existing structures, as well as those not yet built. (Source – 2009 TIGER/Line Shapefiles Technical Documentation)



TIGER/Line Roads Classification

The All Lines Shapefile contains a 5-digit Feature Class Code (MTFCC) intended to classify and describe geographic objects or features. MTFCC definitions are available in the metadata files that accompany each shapefile and relationship file. Table 3 is an excerpt of the MTFCC codes that shows the feature class code definitions for linear transportation features only. The feature codes allow querying different road feature categories for customized symbology and labeling purposes (See Figure 4).

¹ For reasons of confidentiality, under Title 13 of the U.S. Code, the U.S. Census Bureau is not permitted to release individual addresses or geographic coordinates for individual addresses.

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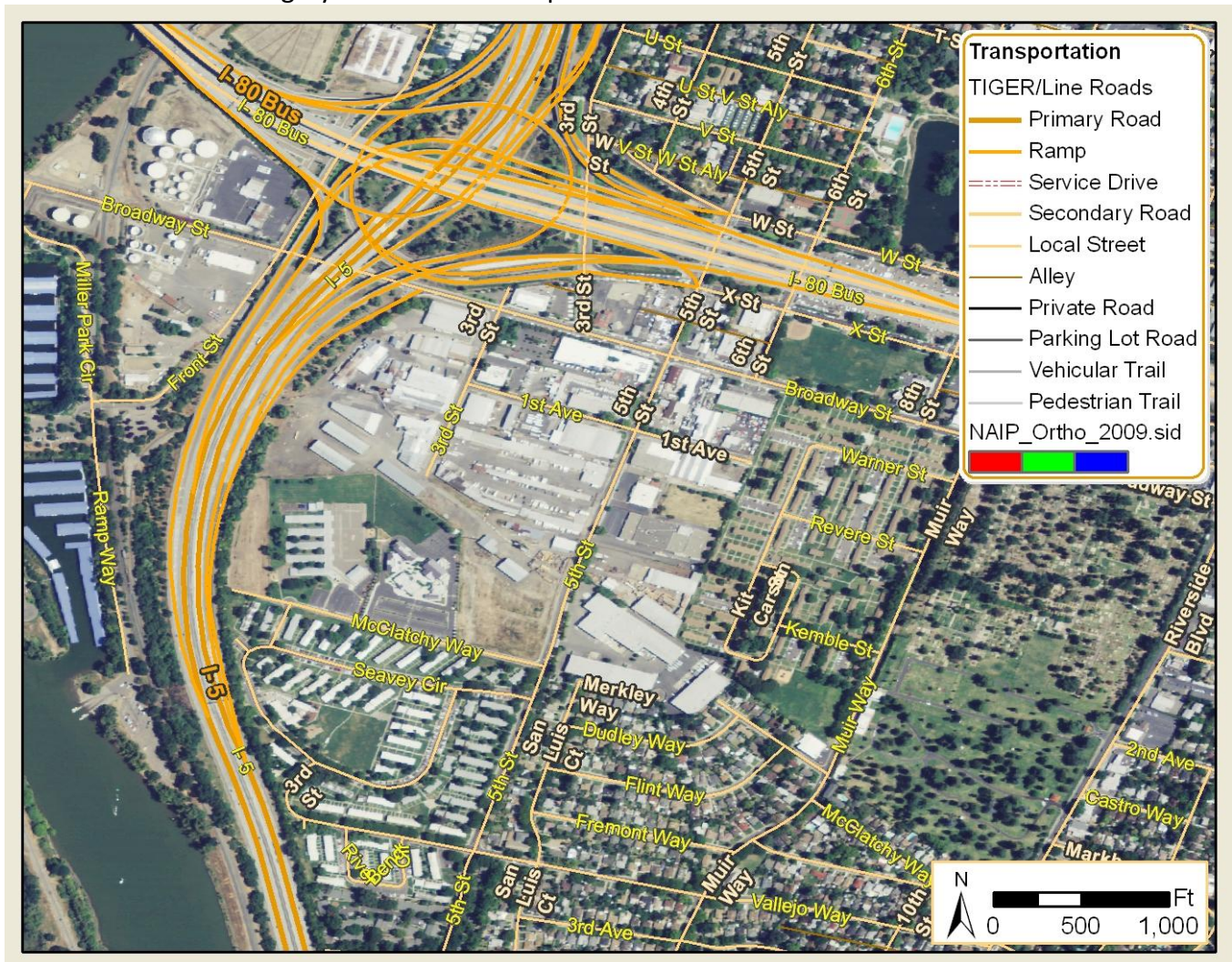
Table 3: MAF/TIGER Feature Class Code (MTFCC) Definitions for Linear Transportation features

MTFCC	FEATURE CLASS	SUPERCLASS	POINT	LINEAR	AREAL	FEATURE CLASS DESCRIPTION
R1011	Railroad Feature (Main, Spur, or Yard)	Rail Features	N	Y	N	A line of fixed rails or tracks that carries mainstream railroad traffic. Such a rail line can be a main line or spur line, or part of a rail yard.
R1051	Carline, Streetcar Track, Monorail, Other Mass Transit Rail	Rail Features	N	Y	N	Mass transit rail lines (including lines for rapid transit, monorails, streetcars, light rail, etc.) that are typically inaccessible to mainstream railroad traffic and whose tracks are not part of a road right-of-way.
R1052	Cog Rail Line, Incline Rail Line, Tram	Rail Features	N	Y	N	A special purpose rail line for climbing steep grades that is typically inaccessible to mainstream railroad traffic. Note that aerial tramways and streetcars (which may also be called ôtramsö) are accounted for by other MTFCCs and do not belong in R1052.
S1100	Primary Road	Road/Path Features	N	Y	N	Primary roads are generally divided, limited-access highways within the interstate highway system or under state management, and are distinguished by the presence of interchanges. These highways are accessible by ramps and may include some toll highways.
S1200	Secondary Road	Road/Path Features	N	Y	N	Secondary roads are main arteries, usually in the U.S. Highway, State Highway or County Highway system. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at-grade intersections with many other roads and driveways. They often have both a local name and a route number.
S1400	Local Neighborhood Road, Rural Road, City Street	Road/Path Features	N	Y	N	Generally a paved non-arterial street, road, or byway that usually has a single lane of traffic in each direction. Roads in this feature class may be privately or publicly maintained. Scenic park roads would be included in this feature class, as would (depending on the region of the country) some unpaved roads.
S1500	Vehicular Trail (4WD)	Road/Path Features	N	Y	N	An unpaved dirt trail where a four-wheel drive vehicle is required. These vehicular trails are found almost exclusively in very rural areas. Minor, unpaved roads usable by ordinary cars and trucks belong in the S1400 category.
S1630	Ramp	Road/Path Features	N	Y	N	A road that allows controlled access from adjacent roads onto a limited access highway, often in the form of a cloverleaf interchange. These roads are unaddressable.
S1640	Service Drive usually along a limited access highway	Road/Path Features	N	Y	N	A road, usually paralleling a limited access highway, that provides access to structures along the highway. These roads can be named and may intersect with other roads.
S1710	Walkway/Pedestrian Trail	Road/Path Features	N	Y	N	A path that is used for walking, being either too narrow for or legally restricted from vehicular traffic.
S1720	Stairway	Road/Path Features	N	Y	N	A pedestrian passageway from one level to another by a series of steps.
S1730	Alley	Road/Path Features	N	Y	N	A service road that does not generally have associated addressed structures and is usually unnamed. It is located at the rear of buildings and properties and is used for deliveries.
S1740	Private Road for service vehicles (logging, oil fields, ranches, etc.)	Road/Path Features	N	Y	N	A road within private property that is privately maintained for service, extractive, or other purposes. These roads are often unnamed.
S1780	Parking Lot Road	Road/Path Features	N	Y	N	The main travel route for vehicles through a paved parking area.
S1820	Bike Path or Trail	Road/Path Features	N	Y	N	A path that is used for manual or small, motorized bicycles, being either too narrow for or legally restricted from vehicular traffic.
S1830	Bridle Path	Road/Path Features	N	Y	N	A path that is used for horses, being either too narrow for or legally restricted from vehicular traffic.
S2000	Road Median	Road/Path Features	N	N	Y	The unpaved area or barrier between the carriageways of a divided road.

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Figure 4: Map showing TIGER/Line 2009 road classes with customized symbology & labeling.
NAIP 2009 imagery used as a basemap



[3] Landmarks

Landmarks presented the greatest diversity of opinion during the stakeholder workshops. It was quite clear during the lengthy discussions of this topic that there is great divergence in the definition and use of landmarks within government agencies. Two factors largely drive this divergence – scale and agency mission. Perhaps the closest area of agreement within landmarks was the use of landmarks as a navigation indicator, i.e., recognizable structures or landscape features that would enable staff to navigate in the aftermath of an event. Many other features, including infrastructure of nearly every type were mentioned in the discussions.

Landmark Public Sources

Local Government Data

The response from diverse stakeholders in the pre-workshops Survey Results and the Requirement Interview Workshops indicated that there is no one source for landmarks that satisfies all business needs. Many local governments and agencies develop and maintain their own landmarks layers. Many local agencies expressed willingness to share their landmark database without restriction, some with limited access to the attribute data. To use landmark data from local sources, a process needs to be established in order to categorize landmarks, standardize their locations and attributes and merge them into one standardized landmark database. The use of landmark data from local governments and agencies would make MEDS more relevant for use in local mitigation and emergencies planning and facilitate communication between local, state and federal governments.

Homeland Security Infrastructure Program (HSIP)

HSIP was created for Federal government homeland security and homeland defense purposes in the aftermath of Sep. 11, 2001 by the National Geospatial-Intelligence Agency (NGA) and the U.S. Geological Survey (USGS). It is a collection of basemap layers and homeland security related geospatial data set for use by government entities at all levels, from federal agencies to local first responders in case of a national emergency.

The NGA leads the geospatial data brokering efforts called HSIP Gold and HSIP Freedom. HSIP Gold totals over 340 data sets, but cannot be shared outside the federal government because some of the underpinning data sources are license-restricted commercial data that helped accelerate the build-up of HSIP data holdings. However, Federal licenses also require that in the event of declared emergencies, that the data may be released to state and local governments to support their operations. Non-government organizations cannot access the HSIP Gold data. As a result, the HSIP Freedom Initiative was developed to make more of the national infrastructure databases available to a wider number of homeland security users, including state, local, tribal and industry partners, and to help move the HSIP toward more license-free open standard-compliant data.

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Approximately 190 datasets were identified from HSIP Gold as license-free and can be shared and distributed among state and local government agencies.

The Department of Homeland Security (DHS) joined the HSIP team (NGA and USGS) as a key federal participant. To facilitate effective communication with a wide range of infrastructure operators; commercial and industrial owners; and federal, state and local agencies, the DHS categorized various critical infrastructure elements into 18 sectors (Appendix 3). These include agriculture and food, banking and finance, posting and shipping, emergency services, energy, information and communications, water supply, public health, law enforcement and chemical manufacturing. The 18 sectors taxonomy structure could be used in categorizing landmark data submitted by local governments and agencies.

USGS Geographic Name Information Systems (GNIS)

The GNIS is the United State's official repository of domestic geographic names information. It was developed by the U.S. Geological Survey in co-operation with the U.S. Board on Geographic Names (BGN) to promote the standardization of feature names. "Anything with a name or designation and a location can be a feature in GNIS" said Mr. Louis Yost, Chief, Geographic Names Project at USGS. The Geographic Names Information System contains name and locational information about physical and cultural features located throughout the United States and its Territories. The federally recognized name of each feature described in the database is identified, and references are made to a feature's location by State, county, and geographic coordinates. GNIS database currently holds over 115,000 entries for California. For each feature the information stored includes its feature name, feature type, elevation range, population range, state or territory name, county name, USGS 7.5' x 7.5' topographic name and alternative names for the feature both past and present.

Landmark Data Sources for MEDS

The Steering Committee decision was to follow two paths in building a landmark service. GNIS will be used as the initial state-wide landmarks datasets and will form the foundation of Landmarks. The long term goal is to use parcel points to provide denser information at a finer, local scale.

GNIS as Initial MEDS Landmark Layer

GNIS database is updated continuously and a downloadable revised version is rolled out every 6-12 months to the public. Thousands of changes per month are validated by USGS staff, and upon request, more frequent updates could be released to government agencies on monthly or quarterly basis. There are no legal restrictions to access or use GNIS data.

Suggested corrections and additions to the data are accepted from any source for review, and upon validation, will be committed to the database. Government agencies at all levels can join the GNIS

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Document Type: data Availability Document

data maintenance program where authorized users could enter and edit feature data directly the Geographic Names Information System Web-based data maintenance application.

USGS is also developing a Web Feature Services Gazetteer (WGS-G) that conforms to Open Geospatial Consortium's (OGC) WFS standard. This service provides query and retrieval of specific Geographic Names features and their attributes into a form usable for analysis in GIS. Some of the advantages of WFS-G framework relevant for use in MEDS landmarks services include:

- Easy implementation in GeoPortal applications
- Supports real-time access and maintenance of Geonames
- Facilitates data currency of Geonames within Web Feature Services
- Enables testing of collaborative maintenance of Geonames using transactions
- Facilitates automated geosynchronization of data across multiple datasets

More details about the USGS Framework Web Feature Services can be found online at:

<http://frameworkwfs.usgs.gov/wfsg/>

While a broad range of feature types are captured in GNIS (See table 4 and figure 5), local governments and agencies consider many additional feature types relevant as landmarks. During MEDS requirements workshops, stakeholders expressed clearly that many features such as police and fire stations, shopping outlets, landfills, quarries, etc. are seen as an essential part of a landmarks basemap, and are the reason they have developed and they maintain their own landmark layers.

Table 4: Feature classes currently captured in GNIS

Airport	Bench	Census	Falls	Island	Oilfield	Reserve	Summit
Arch	Bend	Channel	Flat	Isthmus	Park	Reservoir	Swamp
Area	Bridge	Church	Forest	Lake	Pillar	Ridge	Tower
Arroyo	Building	Civil	Gap	Lava	Plain	School	Trail
Bar	Canal	Cliff	Glacier	Levee	Populated Place	Sea	Tunnel
Basin	Cape	Crater	Gut	Locale	Post Office	Slope	Valley
Bay	Cave	Crossing	Harbor	Military	Range	Spring	Well
Beach	Cemetery	Dam	Hospital	Mine	Rapids	Stream	Woods

Figure 5: GNIS sample in Google Earth - Locations of communication towers and airports in Sacramento County



For full details and downloads, the following is a list of online URLs related to GNIS as of November 2009:

1. To download the latest version of domestic names and for links to file formats :
http://geonames.usgs.gov/domestic/download_data.htm
2. For feature class definitions:
<http://geonames.usgs.gov/pls/gnispublic/f?p=gnispq:8:1265418194588086>
3. For principles, policies, and procedures:
<http://geonames.usgs.gov/domestic/policies.htm>
4. Frequently asked questions:
<http://geonames.usgs.gov/domestic/faqs.htm>

Sustainability Path - Cadastral Data

As noted earlier, HSIP Gold content cannot be shared with local governments except in cases of federally declared emergencies, and GNIS database contains only name and locational information about physical and cultural features, and does not meet all business needs of local governments and agencies. To fill that gap, the MEDS Steering Committee long term plan is to develop a sustainable landmarks database based on parcel data represented as parcel points. The framework for developing and maintaining parcel information for use as MEDs landmarks will be based on the National Cadastral Data Publication Guideline. The guideline describes the minimum set of attributes about land parcels and associated reference data that are used for publication and distribution of cadastral information by cadastral data producers.

The characteristics of the Cadastral Publication Data are set by the Federal Geographic Data Committee's (FGDC) Cadastral Subcommittee based on the National Spatial Data Infrastructure (NSDI) concept documents and the needs and requirements from business processes that drive the need for cadastral data. The following is an excerpt of the characteristics from the Cadstral Data Publication Guideline (May 2009):

- "Published cadastral data will have a single source of authoritative land parcel data and a single authoritative source of cadastral reference data within a single geographic extent. The updates and content of this data must be controlled and managed by designated data stewards (authoritative sources). Access to this data is facilitated by compiling and integrating the authoritative data into trusted data sources at state or regional levels. This reduces duplication of effort and assures that the best available information is used in decision making.
- Attributes are as important as spatial information for decision support.
- The land parcel data must be updated at least annually.
- The published cadastral data must be standardized so that information can be integrated across jurisdictional boundaries.
- The published cadastral data must provide linkages to more detailed information that can be obtained from data producers."

The FGDC Subcommittee for Cadastral Data works in collaboration with cadastral data producers and stakeholders to implement standards and facilitate the sharing of cadastral data as part of the efforts to support a National Spatial Data Infrastructure (NSDI). The cadastral publication data has two components: Cadastral Reference and Land Parcels.

- The cadastral reference elements include information about survey systems, such as subdivisions, geopolitical areas, land grants and the public land survey system (PLSS). Those references are part of legal descriptions and support query, mapping and navigation. Figure 6 illustrates the cadastral reference concepts.

- Land parcels are detailed information about property and its characteristics. Parcel information may be polygons or parcel points and are tied to the earth through the cadastral reference information. Figure 7 illustrates the land parcel component. The attributes in the parcel component contain sufficient information to link to the rich attribute databases from the data producers.

As any other spatial data, cadastral data must be accompanied by metadata. As an NSDI theme, the metadata must conform to the FGDC standards in describing the production agency, contact information, spatial referencing, accuracy and currency.

Figure 6: Cadastral NSDI – Cadastral Reference.

(Source – Cadastral data Publication Guideline – May 2009)

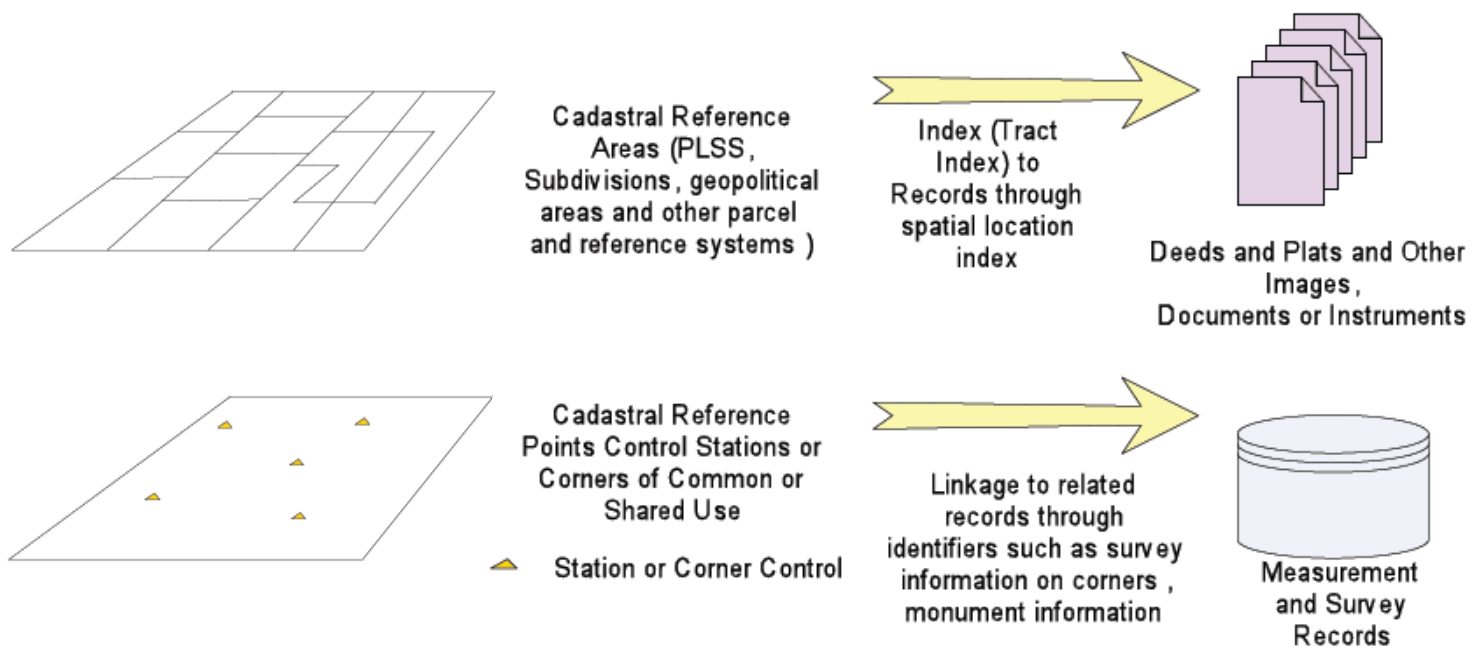
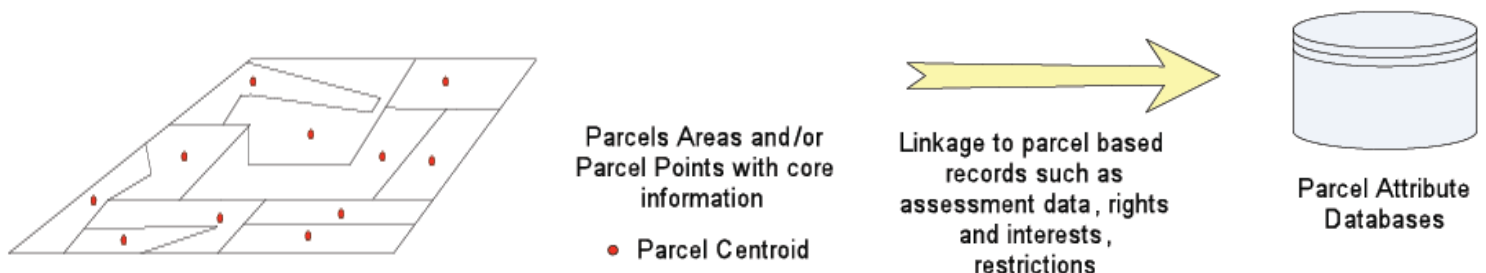


Figure 7: Cadastral NSDI – Parcel Information.

(Source – Cadastral data Publication Guideline – May 2009)



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Document Type: data Availability Document

The full guideline and many other documents related to the Cadastral NSDI and the Cadastral Subcommittee can be found at <http://www.nationalcad.org>

The status of the cadastral land records inventory can be tracked online at the National States Geographic Information Council (NSGIC) GIS Inventory website: <http://www.gisinventory.net>

There is currently no complete and publicly-available cadastral data set for California. Cadastral data are maintained by city and county governments. The National Cadastral inventory coordination effort for parcels is lead by NSGIC.

The California Board of Equalization (BOE) has regulatory control of parcels by statute. For the MEDS project the BOE are going to obtain parcel geometry and tax roll from each county individually. This information will then be transmitted to NationalCAD Resources, an FGDC working group, is cross-walking the tax roll data to 18 common attributes (see Table 5). After this effort the California Natural Resources Agency will create parcel points from the geometry and associate the eighteen attributes which will be available through MEDS.

Table 5: NSDI Core Parcel Feature Class Crosswalk - 18 common attributes

Attribute Type #	FieldName	Field Description	Notes
1	STNAME	State Name	CA
	STFIPS	State FIPS Code	e.g. 6 for CA
	CNTYNAME	County Name	Sacramento
	CNTYFIPS	County FIPS Code	e.g. 67 for Sacramento
2	SOURCEAGENT	Source Agent	Sacramento County Assessor's Office
3	PARNO	Local Parcel Number	APN
4	NPARNO	National Parcel Number	Calculated: {[TFIPS] & [CNTYFIPS] & [PARNO]}
5	STRUCT	Structure Indicator	Calculated: Y/N based on Improved Value
6	IMPROVAL	Improved Value	NVSTRU (DLRI_RPROJECT.Z7)
7	LANDVAL	Land Value	NVLAND (DLRI_RPROJECT.Z7)
8	PARVAL	Total Parcel Value	Calculated
9	PARVALTYPE	Type of Value Reported	PROP 13
10	PARUSECODE	Tax Parcel Use Code	LANDUSE
11	PARUSEDESC	Tax Parcel Use Code Description	GENERAL & SPECIFIC & DETAIL
12	OWNTYPE	Owner Classification or Type	e.g. "State", "County", "Local Community"
13	AREATXT	Area of Parcel as Text	e.g. "0.123 ac"
14	AREANO	Area of Parcel as Number	e.g. 0.123
15	SITEADD	Full Site Address	Calculated: [STREET_NBR]& " " & [STREET_NAM]
	SADDNO	Site Address Number	e.g. 1234
	SADDSTNAME	Site Address Name	STREET_NAM
16	SCITY	Site Address City	e.g. Sacramento
17	REVISEDDATE	Last Revised Date	Date Revised
18	SUBCONDO	Subdivision or Condo Name	SUBDIVISIO

Figure 7: Parcel Points as Landmarks.



APPENDICES

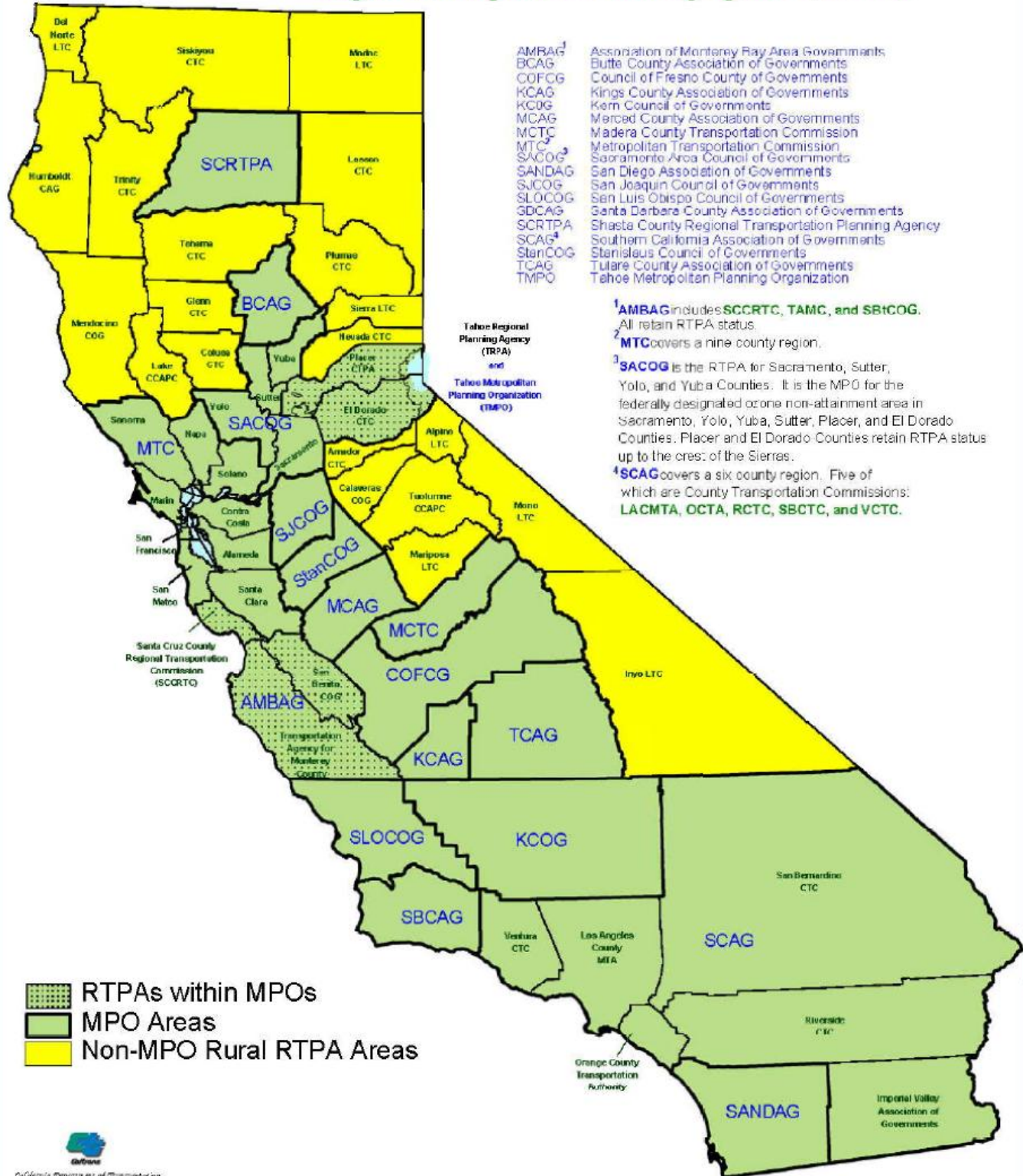
Appendix 1: California MPOs and RTPAs MAP

CALIFORNIA

Metropolitan Planning Organizations(MPOs)

and

Regional Transportation Planning Agencies (RTPAs)



Appendix 2: County, City and other online resources for GIS Transportation Data

County	GIS Data URL
Amador County	http://www.co.amador.ca.us/ACGIS/
Calaveras County	http://www.co.calaveras.ca.us/departments/gisproj.asp
Contra Costa County	http://www.ccmaps.us/
Humboldt County	http://co.humboldt.ca.us/planning/maps/datainventory/gisdatalist.asp
Kern County	http://www.co.kern.ca.us/gis/
Kings County	http://www.countyofkings.com/planning/GIS.html
Lake County	http://gis.co.lake.ca.us/
Marin County	http://www.co.marin.ca.us/depts/IS/main/GIS/index.cfm
Mono County	http://gis.mono.ca.gov/data.asp
Monterey County	http://gisweb.ci.monterey.ca.us/pub/
Napa County	http://gis.napa.ca.gov/gisdata.asp
Sacramento County	http://www.msa.saccounty.net/gis/gis_onlineapps.aspx
San Benito County	http://www.lynxgis.com/sanbenitoco/
San Bernardino County	http://gis.sbcounty.gov/default.aspx
San Francisco County	http://www.sfgov.org/site/gis_index.asp?id=104979
San Luis Obispo County	http://www.ci.san-luis-obispo.ca.us/publicworks/gishome.asp
	http://lib.calpoly.edu/collections/gis/slodatafinder/
Santa Barbara County	http://www.countyofsb.org/itd/gis/default.aspx
Santa Cruz County	http://gis.co.santa-cruz.ca.us/
Shasta County	http://www.co.shasta.ca.us/html/GIS/gis_index.htm
Sonoma County	https://gis.sonoma-county.org/index.htm
Stanislaus County	http://gis.stancounty.com/giscentral/
Tulare County	http://www.co.tulare.ca.us/government/rma/gis/gisdata.asp
Tuolumne County	http://portal.co.tuolumne.ca.us/...
Yolo County	http://www.yolocounty.org/Index.aspx?page=823
Kern Council of Governments : KCOG	http://www.kerncog.org/regional-overview.php
Metropolitan Transportation Commission (MTC)	http://www.mtc.ca.gov/maps_and_data/GIS/data.htm
Sacramento Area Council of Governments (SACOG)	http://www.sacog.org/mapping/clearinghouse/
San Diego Association of Governments (SANDAG)	http://www.sandag.org/...
CalAtlas	http://www.atlas.ca.gov/download.html

Appendix 3: HSIP 18 sectors and sub-sectors

Critical Infrastructure Sectors (with Sub-Sectors) Quick Reference Sheet		
(1) Agriculture and Food	(7) Information Technology	(14) Commercial Facilities
Supply	IT Products & Services	Entertainment & Media Facilities
Processing/Packaging/Production	Incident Management Capabilities	Gambling Facilities/Casinos (Resorts)
Agricultural & Food Product Storage	Internet-Base Content, Information, & Communications Services	Lodging Facilities
Agricultural & Food Product Transportation	Domain Name Resolution Services	Outdoor Events Facilities
Agricultural & Food Product Distribution	Identity Management & Associated Trust Support Services	Public Assembly
Agriculture & Food Supporting Facilities	Internet Routing, Access & Connection Services	Real Estate Facilities
Regulatory, Oversight, & Industrial Organizations	(8) Communications	Retail Facilities
Other Agriculture & Food	Wired Communications	Other Commercial Facilities
(2) Banking and Finance	Wireless Communications	(15) Government Facilities
Banking & Credit	Satellite Communications	Personnel-Oriented Government Facilities
Securities, Commodities, & Financial Investments	Internet	Service-Oriented Government Facilities
Insurance Companies	Information Services	Government Research Facilities
(3) Chemical and Hazardous Materials Industry	Next Generation Networks	Government Storage & Preservation Facilities
Chemical Manufacturing & Processing Plants	Regulatory, Oversight, Industry Organizations	Government Sensor & Monitoring Systems
Hazardous Chemical Transport	Other Telecommunication Facilities	Government Space Systems
Hazardous Chemical Storage/Stockpile/Utilization/ Distribution	(9) Postal and Shipping	Military Facilities
Regulatory, Oversight, Industry Organizations	U.S. Postal Service	Education Facilities
Other Hazardous Chemical Facilities	Couriers	Other Government Facilities
(4) Defense Industry Base	Other Postal & Shipping Facilities	(16) Dams
Shipbuilding Industry	(10) Healthcare and Public Health	Dam Projects
Aircraft Industry	Direct Patient Healthcare	Flood Damage Reduction Systems
Missile Industry	Public Health Agencies	Hurricane & Storm Surge Protection Systems
Space Industry	Healthcare Educational Facilities	Mine Tailings Projects
Combat Vehicle Industry	Health Supporting Facilities	Regulatory, Oversight, & Industry Organizations
Ammunition Industry	Fatality/Mortuary Facilities	(17) Nuclear
Weapons Industry	Regulatory, Oversight, & Industry Organizations	Nuclear Facilities
Troop Support Industry	Other Healthcare & Public Health Facilities	Nuclear Materials
Information Technology Industry	(11) Transportation	Nuclear Waste
Electronics Industry	Aviation	Regulatory, Oversight, & Industry Organizations
Electrical Industry Commodities	Railroad	Other Nuclear Facilities, Materials or Waste
Electronic Industry Commodities	Road	(18) Manufacturing
Mechanical Industry Commodities	Maritime	Food Manufacturing
Structural Industry Commodities	Mass Transit	Beverage Manufacturing
Research & Development Facilities	Pipelines	Tobacco Product Manufacturing
	Regulatory, Oversight, & Industry Organizations	Textile, Textile Product, Apparel, Leather Manufacturing
(5) Energy	(12) Water	Wood Product Manufacturing
Electricity	Raw Water Supply	Paper Manufacturing
Petroleum	Raw Water Transmission	Printing & Related Support Activities
Natural Gas	Raw Water Storage	Petroleum & Coal Products Manufacturing
Coal	Water Treatment Facilities	Chemical Manufacturing
Ethanol	Treated (Finished) Water Storage	Plastics & Rubber Products Manufacturing
Regulatory, Oversight, & Industry Organizations	Treated Water Distribution Systems	Non-metallic Mineral Products Manufacturing
(6) Emergency Services	Treated Water Monitoring Systems	Primary Metal Manufacturing
Law Enforcement	Treated Water Distributions Control Centers	Fabricated Metal Product Manufacturing
Fire, Rescue, & Emergency Services	Wastewater Facilities	Machinery Manufacturing
Search & Rescue	Regulatory, Oversight, & Industry Organizations	Computer & Electronic Product Manufacturing
Emergency Medical Services	(13) National Monuments and Icons	Electric Equipment, Appliance, Component Manufacturing
Emergency Management	National Monument/Icon Structures	Transportation Equipment Manufacturing
Other Emergency Services	National Monument/Icon Geographic Areas	Furniture & Related Products Manufacturing
	National Monument/Icon Documents & Objects	Miscellaneous Manufacturing
	Other National Monuments & Icons	Mining, Quarrying, & Oil & Gas Extraction